Statistics and Data Analysis: Core Assessment #4 Practice 1

It has been claimed that the average math SAT score for high school students is 510 points. However, CB South thinks it is above the average. A random sample of 200 CB South high school students finds that the average math SAT score is 560 points. The standard deviation of this sample is 65.2 points.

1) At $\alpha = 0.01$ can you reject the claim? Please show all work, including the necessary hypotheses, assumptions/conditions, and justify all answers with appropriate calculations.
(3 points total: 2 points for work and 1 point for conclusion and interpretation)

2) Create a 95% Confidence Interval. Please show all work and justify all answers.
(1 point total: ½ point for work and ½ point for interpretation)

* Get out the paper from before, turn over, and complete Core 4 practice #1

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} \qquad \bar{x} \pm t^* \left(s/\sqrt{n}\right)$$

(A) Test the claim at alpha = 0.01 (3 pts)

#2: T test

State	Check
1) SRS	1) Stated
a) $n \geq 30$	a) $200 \geq 30$
3) $pop \geq 10n$	3) There are more than 2000 CBS students (ever)

½

$H_0: \mu = 510$ ½

$H_a: \mu > 510$

$$t = \frac{560 - 510}{\frac{65.2}{\sqrt{200}}} = 10.845$$ ½

$P(t > 10.845) = 3.935 \times 10^{-22}$ ½

$df = 199$

We reject Ho b/c p-value of $3.935 \times 10^{-22} < \alpha = 0.01$. (1)

We have sufficient evidence that the true avg. SAT math score for CBS H.S. is greater than 510 pts.

(B) Create a 95% conf int (1 pt)

T-Interval prgm INVT

$560 \pm (1.972)\left(\frac{65.2}{\sqrt{200}}\right) =$

(½)

$(550.91, 569.09)$

(½) We are 95% confident that the true avg. math SAT score for CBS HS. is btw. 550.91 and 569.09 pts.

Statistics and Data Analysis: Core Assessment #4 Practice 2

The average stay in days for public hospitals is claimed to be 7.2 days. An SRS of 50 such hospitals was selected, and the average stay was found to be 9.1 days with a standard deviation of 0.4 days. Test the hypothesis that the average stay is **different** from the national average.

1) At $\alpha = 0.05$ can you reject the claim? Please show all work, including the necessary hypotheses, assumptions/conditions, and justify all answers with appropriate calculations.
(3 points total: 2 points for work and 1 point for conclusion and interpretation)

2) Create a 95% Confidence Interval. Please show all work and justify all answers.
(1 point total: ½ point for work and ½ point for interpretation)

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} \qquad \bar{x} \pm t^*\left(\frac{s}{\sqrt{n}}\right)$$

(A) Test the claim at alpha = 0.05 (3 pts)

STATE	CHECK
1- SRS	1- Stated
2- n > 30	2- n = 50 > 30
3- pop > 10n	3- there are more than 500 ~~patients~~ hospitals

Ho: $\mu = 7.2$

Ha: $\mu \neq 7.2$

T-test

$$t = \frac{9.1 - 7.2}{\frac{0.4}{\sqrt{50}}} = 33.588$$

$2*P(t > 33.588) = 1.73 \times 10^{-35}$

df = 49

We reject Ho b/c p-value of 1.73×10^{-35} $< \alpha = 0.05$.

We have suff. evid that the true avg. hospital stay is not equal to 7.2 days.

(B) Create a 95% conf int (1 pt)

$$9.1 \pm (2.01)\left(\frac{0.4}{\sqrt{50}}\right)$$

T-Interval

$$= (8.9863, 9.2137)$$

We are 95% conf that the true avg. hospital stay is btw 8.9863 and 9.2137 days.

Statistics and Data Analysis: Core Assessment #4 Practice 3

An environmental group collects a liter of water from an SRS of 45 locations along a stream and measures the amount of contamination in each specimen. The average of the sample is 4.62 milligrams and the standard deviation is 0.92 milligrams. It has been claimed that the contamination level in the stream is 5 milligrams. Using the info in this problem, test to see if stream's contamination level has decreased.

1) At $\alpha = 0.01$ can you reject the claim? Please show all work, including the necessary hypotheses, assumptions/conditions, and justify all answers with appropriate calculations.
(3 points total: 2 points for work and 1 point for conclusion and interpretation)

2) Create a 95% Confidence Interval. Please show all work and justify all answers.
(1 point total: ½ point for work and ½ point for interpretation)

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} \qquad \bar{x} \pm t^*\left(s/\sqrt{n}\right)$$

(A) Test the claim at alpha = 0.05 (3 pts)

State

$H_0: \mu = 5$

$H_a: \mu < 5$

Check

$$t = \frac{4.62 - 5}{0.92/\sqrt{45}} = -2.771$$

$P(t < -2.771) = 0.004$

$df = 44$

We reject H_0 b/c p-value of $0.004 < \alpha = 0.05$

We have suff. evid. that the true avg. contamination level is less than 5 mg

(B) Create a 95% conf int (1 pt)

$$4.62 \pm (2.015)\left(\frac{0.92}{\sqrt{45}}\right)$$

$$= (4.3436, 4.8964)$$

We are 95% conf. that the true avg. contamination level is btw. 4.3436 mg and 4.8964 mg

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

$$\bar{x} \pm t^* \left(s/\sqrt{n} \right)$$